STATEMENT OF BASIS

as required by LAC 33:IX.3109, for draft **Louisiana Pollutant Discharge Elimination System Permit No.** LA0020613; **AI** 33786; **PER20050002** to discharge to waters of the **State of Louisiana** as per LAC 33:IX.2311.

The **permitting authority** for the Louisiana Pollutant Discharge Elimination System (LPDES) is:

Louisiana Department of Environmental Quality
Office of Environmental Services
P. O. Box 4313
Baton Rouge, Louisiana 70821-4313

I. **THE APPLICANT IS:** City of Broussard
Cote Gelee Wetland Wastewater Assimilation Project
310 East Main Street
Broussard, LA 70518

II. **PREPARED BY:** Jim Bondy

DATE PREPARED: January 18, 2007

III. **PERMIT ACTION:** revoke and reissue LPDES permit LA0020613, AI 33786; PER20040001

LPDES application received: March 3, 2005

LPDES permit issued: October 1, 2003
LPDES permit expires: upon permit reissuance

IV. **FACILITY INFORMATION:**

A. The application is for the discharge of treated sanitary wastewater from a publicly owned treatment works serving the City of Broussard.

B. The permit application does not indicate the receipt of industrial wastewater.

C. The facility is located two miles east of Broussard and three miles north of Hwy 90 in Broussard, Lafayette Parish.

D. The treatment facility consists of an oxidation pond. Disinfection is by chlorination.

E. **Outfall 001** sampling point for the treated discharge after the last treatment unit and before distribution to the Cote Gelee Wetland.

Description: treated sanitary wastewater

Design Capacity: 0.75 MGD

Type of Flow Measurement which the facility is currently using:

ultrasonic flowmeter w/ continuous chart recorder

The 4 distribution points for Outfall 001 are oriented in a north-to-south configuration on the west side of Bayou Tortue which runs through the center of the Cote Gelee Wetland. The flow of water in the discharge area of the wetland is west to east, toward Bayou Tortue. This outfall configuration will allow all or any number of the outfalls to flow simultaneously without overlap.

Distribution Point 001A: Located east of the new oxidation pond.

Discharge location: Latitude 30° 10' 45" North
Longitude 91° 55' 00" West

Distribution Point 001B: Located south of outfall 001A

Discharge location: Latitude 30° 10' 30" North
Longitude 91° 55' 15" West

Distribution Point 001C: Located south of outfall 001B

Discharge location: Latitude 30° 10' 15" North
Longitude 91° 55' 20" West

Distribution Point 001D: Located south of outfall 001C

Discharge location: Latitude 30° 10' 13" North
Longitude 91° 55' 20" West

The 4 distribution points (001A – 001D) will be employed simultaneously or in rotation depending upon conditions in the wetland. Distribution sequence and duration will be reported in the annual wetland monitoring report.

V. RECEIVING WATERS:

The discharge is into the Cote Gelee Wetland; thence into Bayou Tortue; thence into the Vermilion River in segment 060801-001 of the Vermilion - Teche Basin.

The designated uses and degree of support for Segment 060801-001 of the Vermilion - Teche Basin are as indicated in the table below[1/]:

Overall Degree of Support for Segment	Degree of Support of Each Use						
Full	Primary Contact Recreation	Secondary Contact Recreation	Propagation of Fish & Wildlife	Outstanding Natural Resource Water	Drinking Water Supply	Shell fish Propagation	Agriculture
	N/A	Full	Full	N/A	N/A	N/A	N/A

[1/]The designated uses and degree of support for Segment 060801_001 of the Vermilion - Teche Basin are as indicated in LAC 33:IX.1123.C.3, Table (3) and the 2004 Water Quality Management Plan, Water Quality Inventory Integrated Report, Appendix A, respectively.

VI. ENDANGERED SPECIES:

The receiving waterbody, Subsegment 060801_001 of the Vermilion - Teche Basin, is not listed in Section II.2 of the Implementation Strategy as requiring consultation with the U. S. Fish and Wildlife Service (FWS). This strategy was submitted with a letter dated September 29, 2006 from Watson (FWS) to Brown (LDEQ). Therefore, in accordance with the Memorandum of Understanding between the LDEQ and the FWS, no further informal (Section 7, Endangered Species Act) consultation is required. It was determined that the issuance of the LPDES permit is not likely to have an adverse effect on any endangered or candidate species or the critical habitat. The effluent limitations established in the permit ensure protection of aquatic life and maintenance of the receiving water as aquatic habitat.

VII. HISTORIC SITES:

The discharge will be from a new facility. Comite Resources, Inc. has consulted with the State Historic Preservation Officer (SHPO) in a letter, dated October 14, 2003, to determine whether construction-related activities could potentially affect sites or properties on or eligible for listing on the National Register of Historic Places. SHPO's response letter, dated November 12, 2003, stated that no known archaeological sites or historic properties will be affected by this project.

VIII. PUBLIC NOTICE:

Upon publication of the public notice, a public comment period shall begin on the date of publication and last for at least 30 days thereafter. During this period, any interested persons may submit written comments on the draft permit and may request a public hearing to clarify issues involved in the permit decision at this Office's address on the first page of the statement of basis. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

Public notice published in:

Local newspaper of general circulation

Office of Environmental Services Public Notice Mailing List

For additional information, contact:

Jim Bondy
Permits Division
Department of Environmental Quality
Office of Environmental Services
P. O. Box 4313
Baton Rouge, Louisiana 70821-4313

IX. PROPOSED PERMIT LIMITS:

Final Effluent Limits:

OUTFALL 001

Systems that discharge to wetlands are given secondary limits. LAC 33:IX.711.D.2.b, states that existing minor facilities with treatment equivalent to Secondary Treatment, such as an oxidation pond

system are given 30 mg/l BOD_5 and 90 mg/l TSS (30-day average) levels of treatment. The secondarily treated wastewater discharged into the natural wetlands provides for the introduction of nutrient rich wastewater and sediments. Both are beneficial to the wetlands in that they stimulate productivity, in the form of increased vegetative growth, and also counter the subsidence rate of the wetland. Additionally, wetlands are known to assimilate the nutrient levels present in secondarily treated wastewater to their advantage.

The Cote Gelee wetland is a forested wetland. The major landowner of the Cote Gelee Wetland is the Billeaud Company. The wastewater assimilation area west of Bayou Tortue has an area of 720 acres. Calculations based on the curves of Richardson and Nicholson have indicated a nutrient loading rate of 7.1 $g/m^2/yr$ for Nitrogen and 2.1 $g/m^2/yr$ for Phosphorus.

Final limits shall become effective on the effective date of the permit and expire on the expiration date of the permit.

Effluent Characteristic	Monthly Avg. (lbs./day)	Monthly Avg.	Weekly Avg.	Basis
BOD_5	188	30 mg/l	45 mg/l	Limits are based on secondary treatment for sanitary wastewater in accordance with LAC33:IX.711D.2.b.
TSS	563	90 mg/l	135 mg/l	Limits are based on secondary treatment for sanitary wastewater in accordance with LAC33:IX.711D.2.b.

Heavy metals and other toxins found in wastewater can have damaging effects on wetland systems. Research has found that the movement of heavy metals in the natural cycle of the wetland vegetation and sediments implies that wetlands are not final sinks for these metals. As a result, effluents with high metals concentrations such as would be introduced by industrial waste **should not** be applied to wetland systems. Due to the potential long-term, detrimental impacts from heavy metals, salts, biocides, and other toxins, wetland discharges should be limited primarily to domestic effluent.

Other Effluent Limitations:

1) **Fecal Coliform**

The discharge from this facility is into a water body (wetland), which has a designated use of Secondary Contact Recreation. However, due to the proximity and hydrological exchange of the Cote Gelee Wetland with Bayou Tortue which has a designated use of Primary Contact Recreation, limits of 200/100 ml (Monthly Average) and 400/100 ml (Weekly Average) are proposed as Fecal Coliform limits in the permit. These limits are being proposed through Best Professional Judgment in order to ensure that the Primary Contact Recreation use for Bayou Tortue is protected, and due to the fact that existing facilities have demonstrated an ability to comply with these limitations using present available technology.

2) **pH**

According to LAC 33:IX.3705.A.1., POTW's must treat to at least secondary levels. Therefore, in accordance with LAC 33:IX.5905.C., the pH shall not be less than 6.0 standard units nor greater than 9.0 standard units at any time.

3) **Solids and Foam**

There shall be no discharge of floating solids or visible foam in other than trace amounts in accordance with LAC 33:IX.1113.B.7.

WETLAND SYSTEM MONITORING

The five (5) year LPDES permit contains technology-based effluent limitations for BOD_5, TSS, and pH reflecting the best controls available. Where these technology-based permit limits do not protect water quality or the designated uses, additional water quality-based effluent limitations and/or conditions are included in the LPDES permits. State narrative and numerical water quality standards are used in conjunction with EPA criteria and other available toxicity information to determine the adequacy of technology-based permit limits and the need for additional water quality-based controls.

The state has established a narrative water quality criterion, which states that:

"No substances shall be present in the waters of the state or the sediments underlying said waters in quantities that alone or in combination will be toxic to human, plant, or animal life or significantly increase health risks due to exposure to the substances or consumption of contaminated fish or other aquatic life." (*Louisiana Surface Water Quality Standards*, LAC Title 33, Part IX, Chapter 11, Section 1113.B.5.)

However, the State of Louisiana has set the following specific criteria for protection of the receiving Natural Wetlands (the Cote Gelee Wetland):

- **NO MORE THAN A 20% DECREASE IN NATURALLY OCCURRING LITTER FALL OR STEM GROWTH;**
- **NO SIGNIFICANT DECREASE IN THE DOMINANCE INDEX OR STEM DENSITY OF BALD CYPRESS;**
- **NO SIGNIFICANT DECREASE IN FAUNAL SPECIES DIVERSITY AND NO MORE THAN A 20% DECREASE IN BIOMASS**

EPA document *Biological Criteria: National Program Guidance for Surface Waters*, discusses the Clean Water Act and states that "the general authority for biological criteria comes from Section 101(a) of the Act which establishes as the objective of the Act the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters, including natural wetlands. To meet this objective, water quality criteria must include criteria to protect biological integrity. Section 101(a)(2) includes the interim water quality goal for the protection and propagation of fish, shellfish, and wildlife." Biological integrity is functionally defined in this EPA manual as "the condition of the aquatic community inhabiting the unimpaired waterbodies of a specified habitat as measured by community structure and function." The importance and function of wetlands include, but are not limited to the following: erosion and flood control, saltwater intrusion control, water quality enhancement, habitat for threatened and endangered species, wildlife habitat, nutrient material cycling, recreation and aesthetics.

Natural wetland loss is a problem in Louisiana. This problem is caused by insufficient sedimentation and relative sea level rise each year. The introduction of nutrient rich wastewater to natural wetlands is beneficial in that it stimulates productivity in the wetland. This productivity promotes vertical accretion through increased organic matter deposition and the formation of soil through increased root growth. This vertical accretion helps

maintain the wetlands, despite the rising water levels. Additionally, the total suspended solids, provided by the wastewater, also increase the sediment level in the wetland.

Although the introduction of wastewater into natural wetlands renders benefits to the wetland system, changes to the system will occur. Therefore, it is important to address issues, which will indicate the extent of these changes and to determine if the changes are acceptable.
While standard biomonitoring indicates affects on organisms found in free flowing streams and rivers, the biological monitoring schedule proposed below is broader in scope, and more specific to the wetland ecosystem, than standard biomonitoring. It will provide a more direct indication of change in functions of the wetland system as a whole. The proposed biological monitoring schedule for the Cote Gelee Wetland Wastewater Assimilation Project is based on BPJ, taking into account the size and characteristics of the wetland system.

The following parameters are proposed to be sampled and monitored for the specified wetland component at all three (3) monitoring sites within the wastewater assimilation area and the two (2) monitoring sites within the control area:

- **Sampling and classifying the flora** present and determining percentage of total cover for each vegetative species. The sampling will provide information on whether dominance and species diversity of the community is being altered.
- **Growth studies of vegetative productivity**, which will provide an indication of health and vigor of the plant community.
- **Water stage** is a gauged measurement of the water depth, which will assist in determining stress in the wetlands from hydrologic loadings and will determine the existence of a zone of influence resulting from wastewater applications. The zone around the discharge serves to assimilate the wastewater most effectively. This zone grows larger as wastewater continues to be discharged and the assimilative capacity of the immediate area becomes saturated.
- **Metals and nutrient data from plant tissue samples**, which will identify excesses or deficiencies that could become problematic.
- **Sediment analysis for metals, and nutrients**, which will indicate whether or not metals are bound and buried in the sediments, and nutrients assimilated.
- **Corresponding analysis of surface water** must be made to provide a comparison of water quality in the vicinity of the discharge and at increasing distance from it.

Compared to data from the baseline study, the effects of the discharge on the biological integrity (as defined above) may be accurately assessed.

From the results from a number of wetland assimilation sites in Louisiana, we conclude that the benthic and nekton community sampling is not likely to provide relevant data for the monitoring program. Therefore, benthic monitoring will no longer be included as part of wetland assimilation permits.

BASIS FOR ESTIMATE OF WETLAND PLANT PRODUCTIVITY

To measure tree production, three plots were established within the discharge area. Also, two control plots were established in the control area. Within each plot, all trees with a diameter at breast height (dbh) greater than 10 cm were marked with an aluminum identification tag and the species recorded. Tree productivity (total above ground) will be determined from measurements of litter fall and dbh measurements. Litter fall will be collected from established litter boxes, separated into leaf and woody material, dried at 60° C and weighted. Monthly litter fall will be summed for each box to obtain annual leaf litter fall. Tree biomass will be estimated using dbh vs. tree biomass allometric equations calculated for each species in similar forests in the southeastern U.S. Changes in biomass from year to year represent annual wood production. These values for annual litter fall and stem growth can be summed to give annual above ground productivity.

The wetland monitoring procedures stipulated as a condition of this permit are as follows:

The permittee shall submit the results of any wetland monitoring testing performed in accordance with the LPDES permit LA0032131, Part II, Section D, shown in the table below:

PARAMETER	WETLAND COMPONENT		
	FLORA	SEDIMENT	SURFACE WATER
Species Classification	P		
Percentage of Whole Cover (for each species)	P		
Growth Studies	A_1		
Water Stage			M
Metals Analysis: Mg, Pb, Cd, Cr, Cu, Zn, Fe, Ni, Ag, Se	P_1	P_1	S
Metals Analysis: Hg, As		P_1	
Nutrient Analysis I: TKN, TP	P_1	P_1	S
Nutrient Analysis II: NH_3N, NO_2N, NO_3N, PO_4		P_1	S
Others: BOD_5, TSS, pH, Dissolved Oxygen			S

Water quality will be monitored by taking water samples along the path of flow of the effluent in the assimilation site and from one or more control sites.

Sampling in the **WASTEWATER ASSIMILATION AREA** must be conducted as follows:
Collection of a minimum of three samples per site in each of three sites: 1) approximately 100' from the discharge point, 2) midway, and 3) at the point of entrance into Bayou Tortue.

Sampling for the **CONTROL AREA** must be conducted as follows:
Collection of a minimum of three samples per site in the two sites: All three samples will be taken from a site or sites similar to the wastewater management area.

A: **ANNUALLY.** Sample once per year at all three (3) WASTEWATER ASSIMILATION AREA sites and the two (2) CONTROL AREA sites and included in the yearly report.

A_1 – Stem growth and litter fall

M: **MONTHLY.** Samples should be taken at all three (3) WASTEWATER ASSIMILATION AREA sites and two (2) CONTROL AREA sites each month and included in the yearly report.

P: **PERIODICALLY.** Sampling must be made once during March through May, and once during September through November in the fourth year of the permit period for all three (3) WASTEWATER ASSIMILATION AREA sites and the two (2) CONTROL AREA sites.

P_1- Sample preservation, handling, and analysis must meet the specifications of the Test Methods for Evaluating Solid Waste Physical/Chemical Methods, third edition (EPA Publication Number SW-846, 1986, or most recent revision) or an equivalent substitute as approved by the administrative authority.

S: **SEMI-ANNUALLY.** Sample twice per year: once during September through February, and once during

March through August (sampling events must be a minimum of 4 months apart) for all three (3) WASTEWATER ASSIMILATION AREA sites and the two (2) CONTROL AREA sites and included in the yearly report.

Sampling procedures to be used during the wetland monitoring phase. (*The Use of Louisiana Swamp Forests for Application of Treated Municipal Wastewater: Standard Operating Procedures for Monitoring the Effects of Effluent Discharge.* John W. Day, Jr., Joel Lindsey, Jason N. Day, and Robert R. Lane, Comite Resources, Inc. Used with the permission of Dr. John W. Day, Jr., March 14, 2003)

WATER QUALITY

1. **Dissolved oxygen and water temperature:** is measured using a Yellow Springs Instrument Co. meter or an ORION Model 820 Dissolved Oxygen meter or equivalent. The probe will be calibrated within four hours of use with a known standard (100% air saturation).

2. **pH & TDS:** Measurements of pH and TDS (Total Dissolved Solids) are made in the field using a Corning Checkmate M90 Field System or equivalent. Water samples will be collected in 500 ml polyethylene bottles and returned to the laboratory where pH will again be measured in the lab using a Jenco Markson pH meter, Model 6100 or equivalent.

3. **Nutrients:** Discrete water samples will be taken 5 to 10 cm below the water surface with effort taken not to stir bottom sediments or include any film that may be present on water surface. Samples are collected in 500 ml acid washed polyethylene bottles. The samples will be immediately stored at 4^{B}C, on ice, for preservation. The samples will be transported to an analytical laboratory, and within 24 hours filtered and sub-sampled. Samples analyzed for $NO_2 + NO_3$, NH_4 and PO_4 will be filtered in the laboratory using 0.45 um Whatman GF/F glass fiber filters or equivalent, and unfiltered samples will be sub-sampled into 125 mL bottles. Both filtered and unfiltered samples will be frozen until analysis. The samples will be analyzed for nitrite + nitrate ($NO2+NO_3$-N), ammonium (NH_4-N), total nitrogen (TN), total phosphorus (TP), and phosphate (PO_4-P) by an EPA and DEQ approved analytical laboratory using Standard Methods.

4. **Total Suspended Solids:** TSS will be determined by filtering 100-200 mL of sample water through re-rinsed, dried and weighed 47 mm 0.45 um Whatman GF/F glass fiber filters. Filters will then be dried for 1 hr at 105^{B} C, weighted, dried for another 15 minutes, and reweighed for quality assurance (Standard Methods 1992).

5. **Biological Oxygen Demand:** BOD samples will be collected in standard 300 ml glass BOD bottles. BOD_5 analysis will be from water samples collected in 500ml polyethylene bottles, stored on ice and taken to the laboratory for analysis. Initial D.O. will be measured within 24 hours. Final D.O. will be measured after 5 days of incubation at 20^{B}C. Measurement of BOD is the responsibility of the facility.

6. **ICP Analysis:** Water samples will be collected from the effluent pipe and surface water in the treatment and control area for ICP and IC analysis. The following will be measured: Mg, Pb, Zn, and Cr. The results of the ICP and IC analysis will be used in reporting the metals and nutrient parameters.

7. **Coliform Analysis:** Fecal coliform (i.e. *Escherichia coli)* will be tested using membrane filtration as a field preparation, and then sent to an EPA certified laboratory for analysis. Ten ml of sample water will be passed through a 0.45 micron filter. The filter will be stored in a sterile petri dish and brought within 8 hrs to a certified laboratory for analysis.

8. **Statistical Analysis:** One-way analysis of variance analysis will be carried out to compare treatment and

control area parameters using statistical software. An alpha probability level of <0.05 will be used to define a significant difference. Comparisons of means with significant ANOVA tests will be made using Tukey-Kramer Honestly Significant Difference (HSD) test (Sall and Lehman 1996). Other statistical tests may be used as appropriate.

SOILS

1. **Sediment Cores**: At least one sediment core will be taken from each study site (Treatment & Control) with a 7.5 cm stainless steel corer. Following the removal of large litter debris, the top 10 to 20 cm of the samples will be separated by horizon, dried, ground and analyzed. Parameters measured will include: pH, electrical conductivity (EC), Mg, Pb, Cd, Cr, Cu, Zn, Fe, Ni, Ag, Se, NH_3-N, NO_2+NO_3-N, PO_4-P, TKN, and TP. All elemental analyses will be done using an inductively coupled argon plasma quantometer (ICP). Results will be reported as the average of duplicate analyses that are within a 10% confidence interval. The results will be based on oven dry weight.

VEGETATION

To sample forest vegetation, three or more subplots should be established at each main plot. Normally, main plots will be established at a near, mid, and outlet locations in the Assimilation site, and another main plot established at a Control site. Each plot will be orientated perpendicular to the hydrological gradient. All trees >10 cm in diameter at breast height (dbh) within each plot will be tagged with an identification number.

1. **Tree Species Composition:** The relative importance of each major tree species in both the Assimilation and Control areas will be based on the density (total number), dominance (basal area), and frequency of occurrence in each of the plots using equations 1-4 (Barbour et al. 1987).

Relative density = (individuals of a species)/(total individuals of all species)	(1)
Relative dominance = (total basal area of a species)/(total basal area of all species)	(2)
Relative frequency = (frequency of species)/(total frequency of all species in area)	(3)
Importance Value = Relative density + Relative dominance + Relative Frequency	(4)

2. **Above Ground Biomass:** Biomass production of a forested wetland is defined as the sum of the leaf and fruit fall (ephemeral productivity) and aboveground wood production (perennial productivity, Newbould 1967).

   A. **Ephemeral or litter fall Productivity:** To estimate ephemeral productivity, litter fall should be collected using 0.25 m^2 boxes with 1 mm mesh bottoms. At least 2 leaf litter boxes should be installed in each subplot (a minimum of 6 boxes at each main plot). The boxes will be placed randomly in each plot. The baskets will be elevated to prevent inundation during high water periods. Litter fall should be collected bimonthly or monthly depending on the season (litter fall is highest during Fall and Winter). We use the term 'leaf litter' in reference to all non-woody litter including flowers, fruits, and seeds that typically account for <10% of the non-woody litter fall total (Megonigal and Day 1988). Leaf litter will be separated from woody litter, dried to constant mass at 65^BC, and weighed. Leaf litter weights throughout any given year will be summed and extrapolated to g $m^{-2}yr^{-1}$ units.

   B. **Perennial Productivity:** Stem biomass will be estimated from annual changes in wood biomass calculated using allometric equations based on stem diameter at breast height (dbh ~ 0.3m) as the independent variable (Table 1). The diameter at breast height (dbh) of all tagged trees will be measured above and below (~5 cm) the identification tag during the winter dormant period. This method allows measurement a safe distance from the tag's nail, which often caused the trunk to swell. Diameter will be measured above the butt swell on large cypress trees. Woody production will be calculated using regression equations (Scott et al. 1985; Megonigal et al. 1997, Table 1) based on the diameter for each species as the independent variable. We assume that the contribution of wood and stems <10 cm dbh and herbs will be a relatively small fraction of above-ground net primary production

(Megonigal et al. 1997). The change in biomass from one winter's measurement to the next represents woody production for the year and will be extrapolated to g $m^{-2}yr^{-1}$ units.

C. **Net Primary Production:** Aboveground net primary production (NPP) will be calculated as the sum of leaf litter and wood protection, and will be given in g $m^{-2}yr^{-1}$ units.

Table 1. Regression equations used to convert diameter at breast height (DBH) measurements to overall perennial biomass. All equations are in the form: Biomass = f (DBH), where biomass is in kg, DBH is in cm and f is the parameterized function.

Species	Biomass f(D)	DBH Range
	Reference	
Fraxinus spp.	Biomass (kg) = ((2.669*((DBHcm*0.394)^1.16332))*0.454	>10 cm
	Megonigal et al. '97 Biomass (kg) = 10^(-.97+2.34*LOG10(DBHcm))	
Taxodium distichum	>10 cm Megonigal et al. '97 Biomass (kg) = 10^(-919+2.291*LOG10(DBHcm))	>10 cm
	Megonigal et al. '97	
Nyssa aquatica	Biomass (kg) = ((2.39959*((DBHcm*0.394)^2)^1.2003))*0.454	10-28 cm
	Megonigal et al. '97	
Acer rubrum	Biomass (kg) = ((3.15067*((DBHcm*0.394)^2)^1.21955))*0.45	10-28 cm
	Megonigal et al. '97	
Quercus nigra	Biomass (kg) = ((5.99898*((DBHcm*0.394)^2)^1.08527))*0.45	>28 cm
	Megonigal et al. '97	
Salix spp.	Biomass (kg) = 10^(-1.5+2.78*LOG10(DBHcm))	n.a.
	Scott et al. 1985	
Other Species	Biomass (kg) = ((2.54671*((DBHcm*0.394)^2)^1.20138))*0.45	10-28 cm
	Megonigal et al. '97	
	Biomass (kg) = ((1.80526*((DBHcm*0.394)^2)^1.27313))*0.45	>28 cm
	Megonigal et al. '97	

3. **Understory Vegetation:** Shrubs, saplings (individuals <10cm dbh but >2.5 cm dbh), and seedlings (individuals <2.5 cm dbh) will be tabulated by species in a 5m X 5m plot established in each subplot. From the data, density and basal area will be calculated for trees and density will be calculated for sapling and seedling species.

The present cover for herbaceous vegetation will be determined by a modified line-intercept technique patterned after that proposed by DS&N, Inc. (1988). The method consists of observations made of plant species occurring along a 1m X 10m transect located at the eastern edge of each plot. Each 10m section is divided into 1m X 1m intervals. Species cover will be determined on the basis of the percent cover occupied within each 1m X 10m unit. Herbaceous plots will be measured at least once during the study.

4. **Nutrient and Metals Analysis of Green Leaves:** Green leaf samples should be collected during the last year of the monitoring from the major species in the treatment and control areas, once during March through May and once during September through November. Samples will be oven-dried at $70^{B}C$ for at least 48 hours, ground in a Wiley mill to pass a 40 mesh screen, and stored in whirl-pak bags. Samples will be analyzed in the laboratory for Mg, Pb, Cd, Cr, Cu, Zn, Fe, Ni, Ag, Se, TKN and TP. The tissue analyses should be done by a wet digestion method.

5. **Marsh Vegetation Production:** Net production in areas dominated by non-woody herbaceous vegetation will be determined by end of season live (EOSL) biomass analysis. Sampling should be conducted during the last week of September or the first week of October. At least five 0.06 m^2 clip plots will be taken at each location using randomly placed quadrants. Vegetation within the quadrant will be cut as close to the surface as possible,

stored in labeled paper bags, brought back to the laboratory, and refrigerated until processing. Live material will be separated from dead, and dried at 60^B C to a constant weight. All data will be presented on a live dry weight per square meter basis (g dry wt m^{-2}).

X. PREVIOUS PERMITS:

LPDES Permit No. LA0020613: Issued: October 1, 2003
Expires: upon permit reissuance

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Daily Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow	Report	Report	Continuous	Recorder
$CBOD_5$				
May – December	10 mg/l	15 mg/l	1/week	3 Hr. Composite
January – April	20 mg/l	30 mg/l	1/week	3 Hr. Composite
TSS				
May – December	15 mg/l	23 mg/l	1/week	3 Hr. Composite
January – April	20 mg/l	30 mg/l	1/week	3 Hr. Composite
Ammonia-Nitrogen				
May – December	5 mg/l	10 mg/l	1/week	3 Hr. Composite
January – April	10 mg/l	20 mg/l	1/week	3 Hr. Composite
Dissolved Oxygen	5 mg/l minimum		2/month	Grab
Fecal Coliform				
Colonies/100 ml	200	400	2/month	Grab
pH	Range (6.0 su – 9.0 su)		2/month	Grab

The permit contains pollution prevention language.

XI. ENFORCEMENT AND SURVEILLANCE ACTIONS:

A) Inspections

A review of the files indicates the following inspection was performed:

Date - September 11, 2006
Inspector - LDEQ
Findings and/or Violations -

1. The DMR review, from July 2005-June 2006, revealed excursions for Ammonia-Nitrogen, TSS, and Fecal Coliform. Specifically, there were 31 Ammonia-Nitrogen excursions, 1 TSS excursion, and 5 Fecal Coliform excursions.
2. Non-compliance reports are being completed and submitted.

B) Compliance and/or Administrative Orders

A review of the files indicates that there are no recent enforcement actions administered against this facility.

C) DMR Review

A review of the discharge monitoring reports for the period beginning October 1, 2004 through June 30, 2006 has revealed the following violations:

Month	Parameter	Permit Limit	DMR Reported Value
October 2004	NH_3, Monthly Avg.	5 mg/l	8.5 mg/l
	NH_3, Weekly Avg.	10 mg/l	11 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	55 lb/day
November 2004	NH_3, Monthly Avg.	5 mg/l	14.3 mg/l
	NH_3, Weekly Avg.	10 mg/l	15.9 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	54 lb/day
December 2004	TSS, Weekly Avg.	23 mg/l	26 mg/l
	NH_3, Monthly Avg.	5 mg/l	9.9 mg/l
	NH_3, Weekly Avg.	10 mg/l	14.6 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	32 lb/day
January 2005	TSS, Monthly Avg.	20 mg/l	28 mg/l
	TSS, Weekly Avg.	30 mg/l	35 mg/l
	NH_3, Monthly Avg.	10 mg/l	15.8 mg/l
	NH_3, Weekly Avg.	20 mg/l	18.1 mg/l
February 2005	NH_3, Monthly Avg.	5 mg/l	16.6 mg/l
	NH_3 (mass), Monthly Avg.	62 lb/day	196 lb/day
March 2005	TSS, Monthly Avg.	20 mg/l	29 mg/l
	TSS, Weekly Avg.	30 mg/l	34 mg/l
	NH_3, Monthly Avg.	10 mg/l	17.9 mg/l
April 2005	TSS, Monthly Avg.	20 mg/l	34 mg/l
	TSS, Weekly Avg.	30 mg/l	44 mg/l
	NH_3, Monthly Avg.	10 mg/l	24.6 mg/l
	NH_3, Weekly Avg.	20 mg/l	28.7 mg/l
May 2005	TSS, Monthly Avg.	15 mg/l	33 mg/l
	TSS, Weekly Avg.	23 mg/l	48 mg/l
	NH_3, Monthly Avg.	5 mg/l	20.4 mg/l
	NH_3, Weekly Avg.	10 mg/l	27.8 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	48 lb/day
	Fecal Coliform, Weekly Avg.	400 colonies/ml	>1000 colonies/ml
June 2005	TSS, Monthly Avg.	15 mg/l	25 mg/l
	TSS, Weekly Avg.	23 mg/l	31 mg/l
	TSS (mass), Monthly Avg.	93 lb/day	132 lb/day
	NH_3, Monthly Avg.	5 mg/l	6.7 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	35 lb/day
	Fecal Coliform, Weekly Avg.	400 colonies/ml	>1000 colonies/ml
July 2005	NH_3, Monthly Avg.	5 mg/l	13 mg/l
	NH_3, Weekly Avg.	10 mg/l	14.8 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	76 lb/day
	Fecal Coliform, Weekly Avg.	400 colonies/ml	>1000 colonies/ml
August 2005	NH_3, Monthly Avg.	5 mg/l	18.8 mg/l
	NH_3, Weekly Avg.	10 mg/l	19.4 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	142 lb/day
	Fecal Coliform, Weekly Avg.	400 colonies/ml	>1000 colonies/ml
September 2005	NH_3, Monthly Avg.	5 mg/l	17.2 mg/l
	NH_3, Weekly Avg.	10 mg/l	18.6 mg/l
	NH_3 (mass), Monthly Avg.	31 lb/day	78 lb/day
	Fecal Coliform, Weekly Avg.	400 colonies/ml	>1000 colonies/ml
October 2005	NH_3, Monthly Avg.	5 mg/l	17.1 mg/l

	NH_3, Weekly Avg. NH_3 (mass), Monthly Avg.	10 mg/l 31 lb/day	18.6 mg/l 59 lb/day
November 2005	NH_3, Monthly Avg. NH_3, Weekly Avg. NH_3 (mass), Monthly Avg. Fecal Coliform, Weekly Avg.	5 mg/l 10 mg/l 31 lb/day 400 colonies/ml	18.3 mg/l 20.7 mg/l 158 lb/day >1000 colonies/ml
December 2005	NH_3, Monthly Avg. NH_3, Weekly Avg. NH_3 (mass), Monthly Avg.	5 mg/l 10 mg/l 31 lb/day	17.8 mg/l 19.2 mg/l 131 lb/day
January 2006	NH_3, Monthly Avg. NH_3, Weekly Avg. NH_3 (mass), Monthly Avg.	5 mg/l 10 mg/l 31 lb/day	17.1 mg/l 18.8 mg/l 147 lb/day
March 2006	NH_3, Monthly Avg. NH_3, Weekly Avg.	10 mg/l 20 mg/l	18.9 mg/l 20.7 mg/l
April 2006	NH_3, Monthly Avg. NH_3, Weekly Avg. Fecal Coliform, Weekly Avg.	10 mg/l 20 mg/l 400 colonies/ml	10 mg/l 20 mg/l >1000 colonies/ml
May 2006	NH_3, Monthly Avg. NH_3, Weekly Avg. NH_3 (mass), Monthly Avg.	5 mg/l 10 mg/l 31 lb/day	8.4 mg/l 13.9 mg/l 36 lb/day
June 2006	NH_3, Monthly Avg. NH_3, Weekly Avg. NH_3 (mass), Monthly Avg.	5 mg/l 10 mg/l 31 lb/day	15.1 mg/l 18.5 mg/l 59 lb/day

XII. ADDITIONAL INFORMATION:

At the present time, the City of Broussard discharges into and unnamed swamp, thence into Bayou Tortue. A Use Attainability Analysis (UAA) was conducted from August 2003 through April 2005 to determine the suitability of the Cote Gelee Wetlands, for assimilation of secondarily treated municipal effluent. It was found that the wetland community in the area consists primarily of cypress-tupelo forested wetlands. These forested wetlands are characterized by over drained and well oxidized soils, which have led to a high level of soil oxidation and subsidence of the soil surface indicated by exposed roots. The soil surface has subsided by 1 – 2 feet. This condition could lead to a massive blow-down of the forest during a major storm passage. Subsidence in the region has been caused by a combination of impoundment by artificial levees, which has stopped the inflow of water and soil building materials that would normally be present during spring flooding events, and by over-drainage, which has led to rapid drainage of the area. The proposed wastewater treatment project will be beneficial to the forest by introducing much needed water and nutrients. This introduction of wastewater will counteract future subsidence by (1) creating anoxic soil conditions, immediately halting the current oxidation of the soil surface, and (2) by stimulating vegetative productivity by nutrient addition, increasing organic matter deposition and raise soil surface elevations. This wetland wastewater assimilation project will be a benefit both economically and ecologically. In addition, a nutrient loading rate analysis indicates that the forested wetlands will assimilate 70-90% of nitrogen and 55-75% of phosphorus discharged from in the secondarily treated effluent from the City's oxidation pond. It is also expected that the productivity of the swamp forest will be enhanced and oxidation of the soil will be slowed or reversed. The overall results of the study indicate that the use of the forested wetlands for wastewater assimilation will be a long-term solution for treatment of the effluent of the City's oxidation pond. (*Broussard Wetland Wastewater Assimilation Use Attainability Analysis, UAA for the City of Broussard, Louisiana,* by John W. Day, Ph.D., Robert R. Lane, Ph.D., Joel Lindsey, and Jason Day)

The Department of Environmental Quality reserves the right to impose more stringent discharge limitations and/or additional restrictions in the future to maintain the water quality integrity and the designated uses of the receiving water bodies based upon water quality studies. These studies may indicate the need for advanced wastewater treatment. Studies of similar dischargers and receiving water bodies have resulted in monthly average effluent limitations of 5 mg/l $CBOD_5$, and 2 mg/l NH_3-N. Therefore, prior to upgrading or expanding this facility, the permittee should contact the Department to determine the status of the work being done to establish future effluent limitations and additional permit conditions.

Final effluent loadings (i.e. lbs/day) have been established based upon the permit limit concentrations and the design capacity of 0.75 MGD.

Effluent loadings are calculated using the following example:

BOD: 8.34 lb/gal x 0.75 MGD x 30 mg/l = 188 lb/day

At present, the **Monitoring Requirements, Sample Types, and Frequency of Sampling** as shown in the permit are standard for facilities of flows between **0.50** and **1.00** MGD.

Effluent Characteristics	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow	Continuous	Recorder
BOD_5	1/week	3 Hr. Composite
Total Suspended Solids	1/week	3 Hr. Composite
Fecal Coliform Bacteria	1/week	Grab
pH	1/week	Grab

Pretreatment Requirements

Due to the absence of categorical users, it is recommended that LDEQ Option 1 Pretreatment Language be included in LPDES Permit LA0040941. This language is established for municipalities that do not have either an approved or required Pretreatment Program. This recommendation is in accordance with 40 CFR Part 403 regulations, the General Pretreatment Regulations for Existing and New Sources of Pollution contained in LAC Title 33, Part IX, Subpart T and the Best Professional Judgment (BPJ) of the review (Melissa Reboul).

XIII TENTATIVE DETERMINATION:

On the basis of preliminary staff review, the Department of Environmental Quality has made a tentative determination to revoke and reissue a permit for the discharge described in this Statement of Basis.

XIV REFERENCES:

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LPDES Permit Application to Discharge Wastewater, City of Broussard, Cote Gelee Wetland Wastewater Assimilation Project, March 3, 2005.